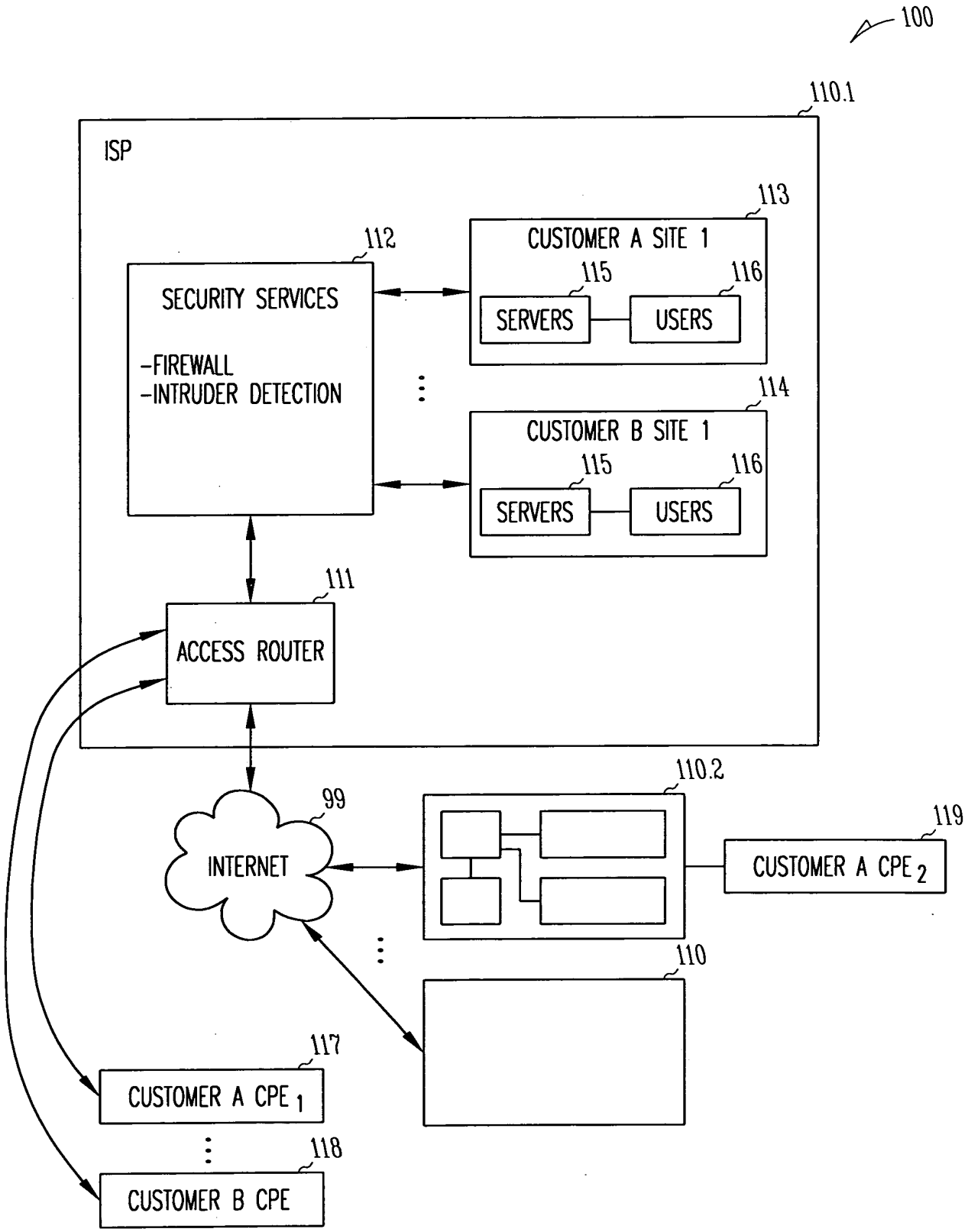


Fig. 1

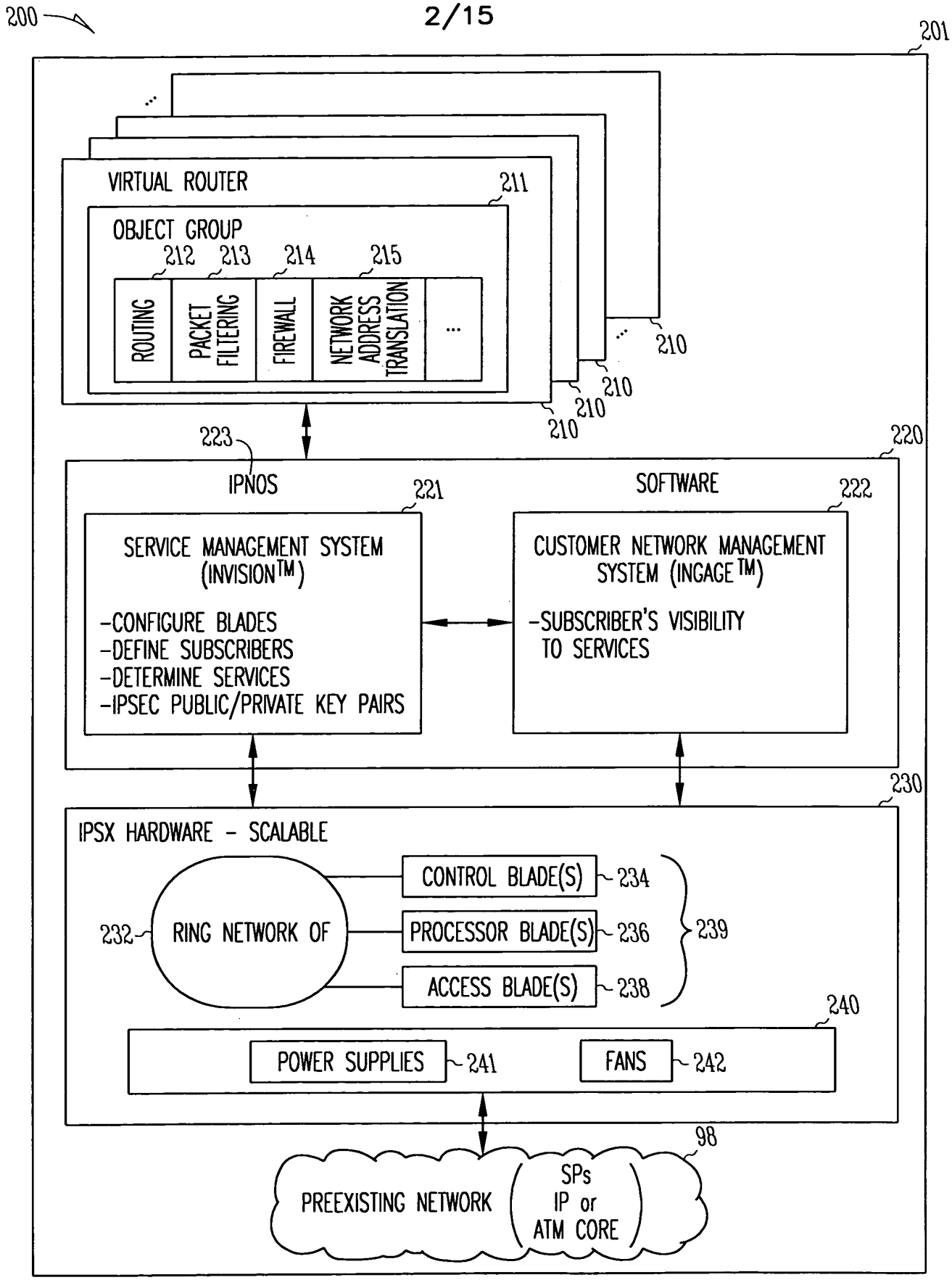

200
201
VIRTUAL ROUTER
211
OBJECT GROUP
212
213
214
215
ROUTING
PACKET FILTERING
FIREWALL
NETWORK ADDRESS TRANSLATION
...
210
210
210
210
223
220
IPNOS
221
SOFTWARE
222
SERVICE MANAGEMENT SYSTEM (INVISION™)
-CONFIGURE BLADES
-DEFINE SUBSCRIBERS
-DETERMINE SERVICES
-IPSEC PUBLIC/PRIVATE KEY PAIRS
CUSTOMER NETWORK MANAGEMENT SYSTEM (INGAGE™)
-SUBSCRIBER'S VISIBILITY TO SERVICES
230
IPSX HARDWARE - SCALABLE
232
RING NETWORK OF
CONTROL BLADE(S)
234
PROCESSOR BLADE(S)
236
ACCESS BLADE(S)
238
239
240
POWER SUPPLIES
241
FANS
242
98
PREEXISTING NETWORK
SPs IP or ATM CORE

Fig.2

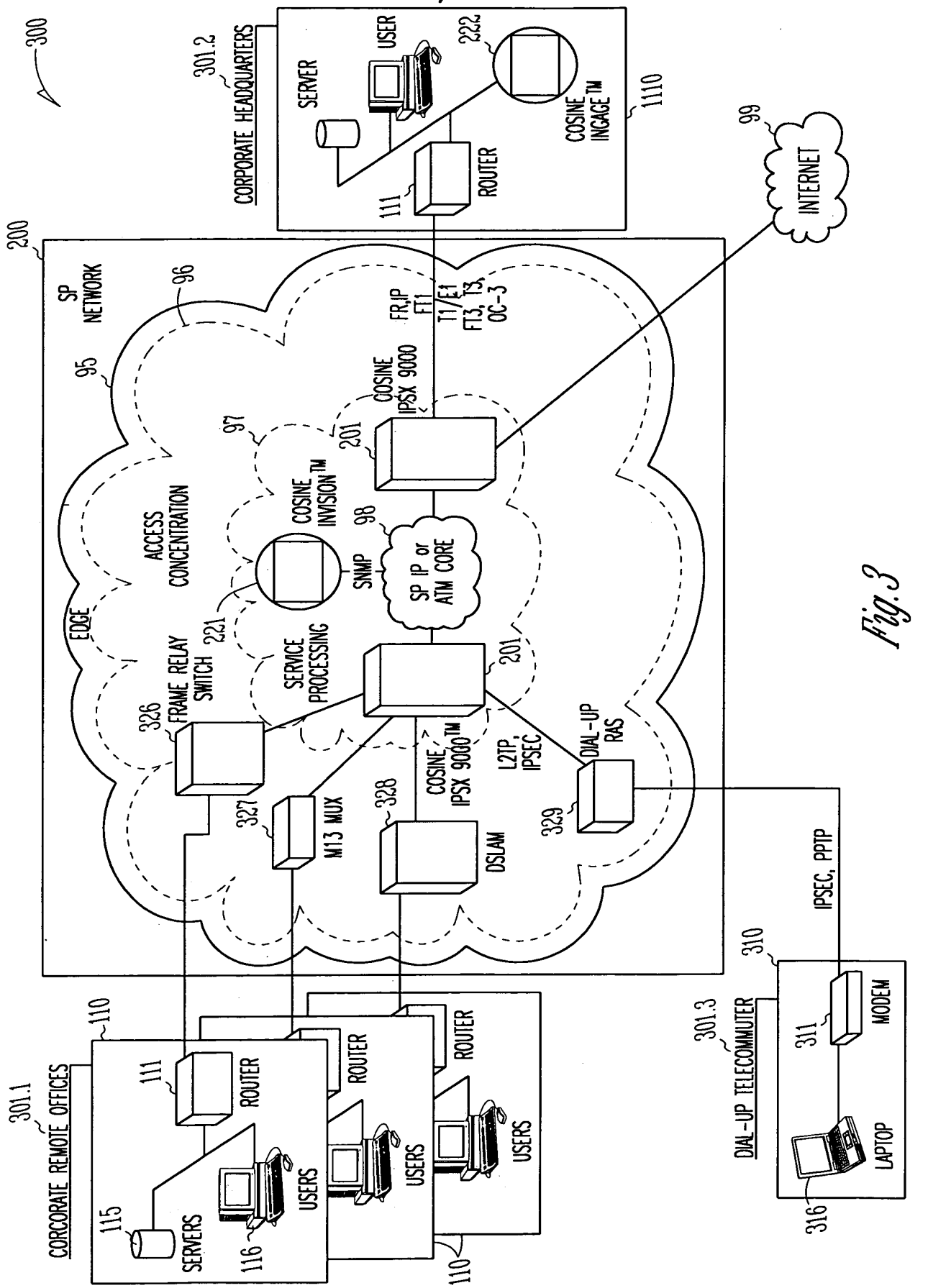
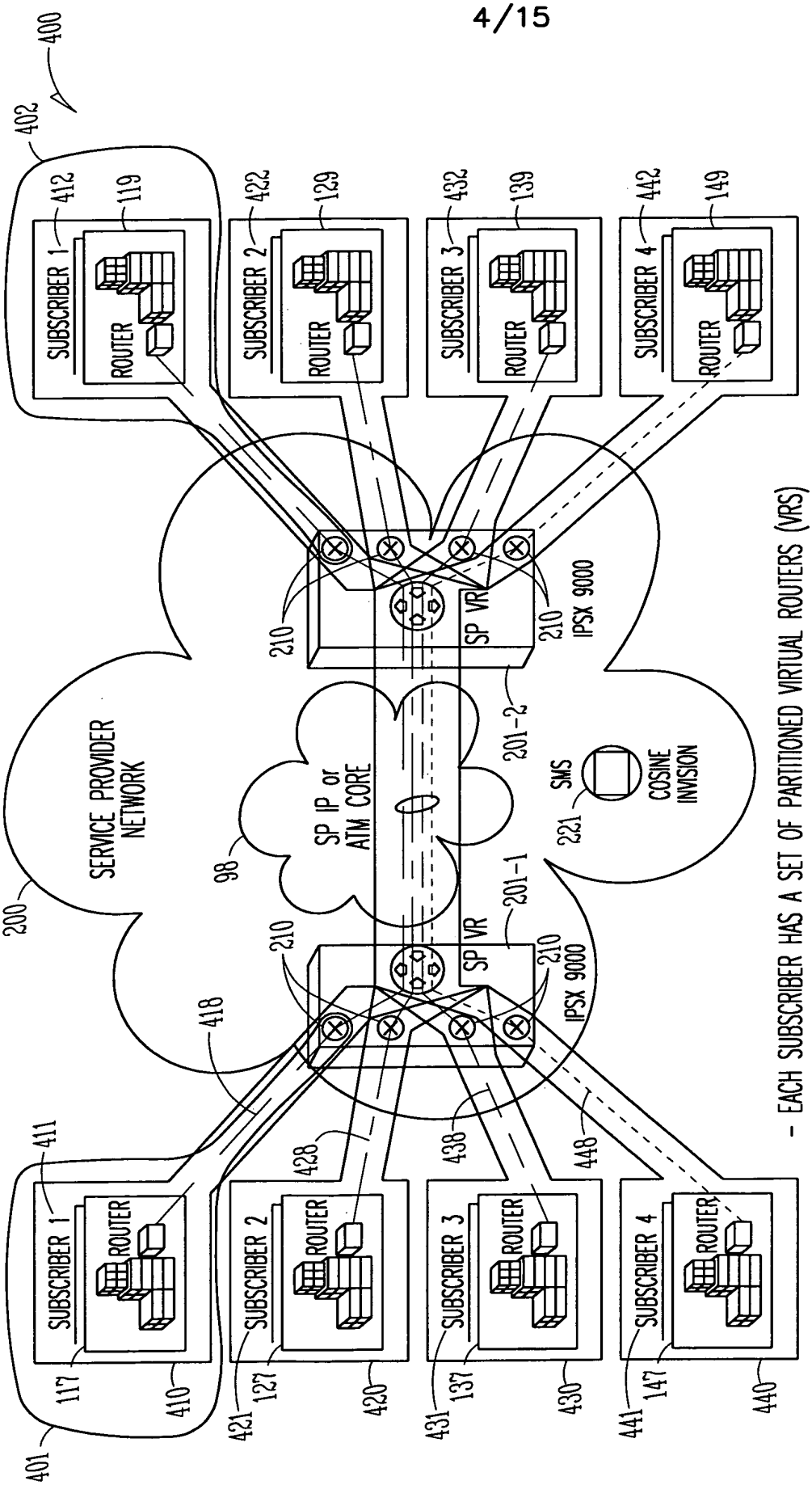
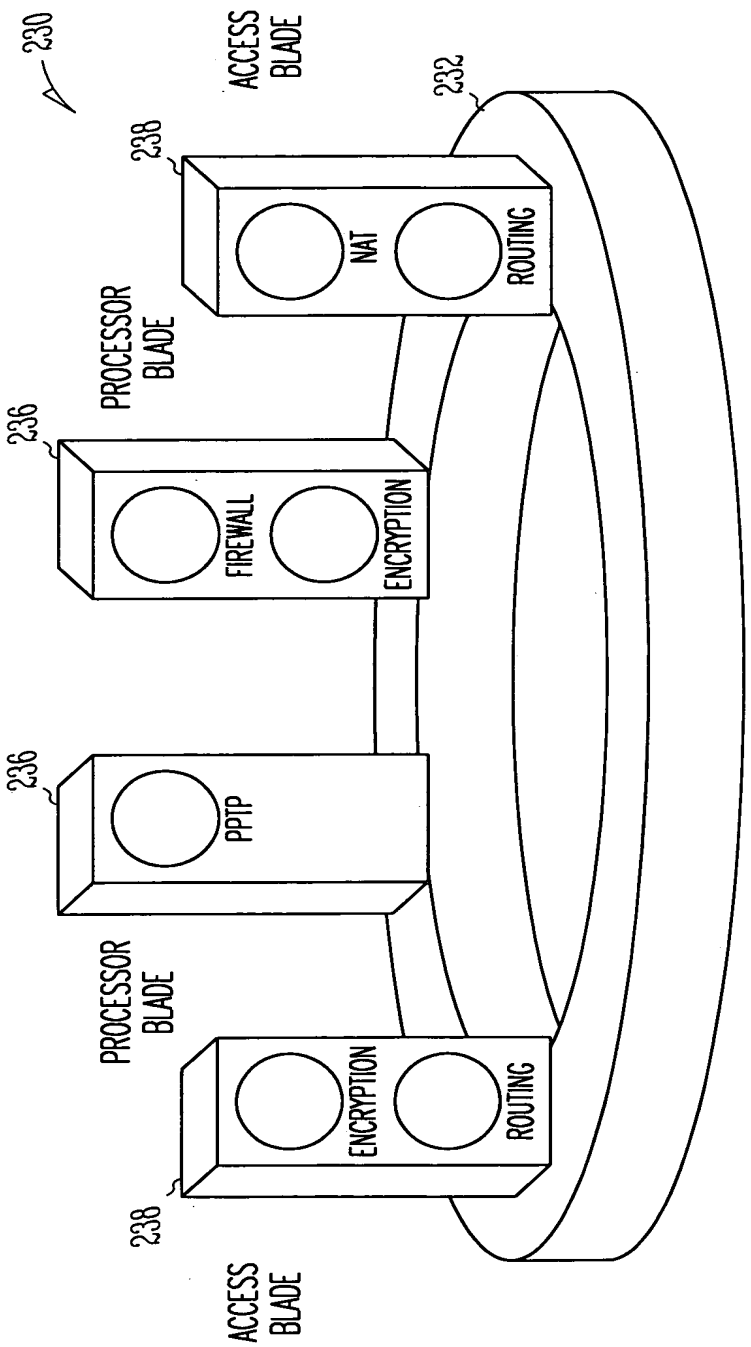

300
301.2
CORPORATE HEADQUARTERS
SERVER
USER
222
COSINE INGAGE™
1110
ROUTER
111
99
INTERNET
200
SP NETWORK
96
95
FR,IP FT1
T1/E1 FT3, T3, OC-3
COSINE IPSX 9000
97
201
COSINE INVISION™
98
ACCESS CONCENTRATION
SNMP
SP IP or ATM CORE
EDGE
221
SERVICE PROCESSING
201
326
FRAME RELAY SWITCH
COSINE IPSX 9000™
L2TP, IPSEC
DIAL-UP RAS
327
M13 MUX
328
DSLAM
329
IPSEC, PPTP
310
301.3
DIAL-UP TELECOMMUTER
311
MODEM
LAPTOP
316
110
301.1
CORPORATE REMOTE OFFICES
111
ROUTER
ROUTER
ROUTER
USERS
USERS
USERS
115
SERVERS
116
110

Fig. 3



- EACH SUBSCRIBER HAS A SET OF PARTITIONED VIRTUAL ROUTERS (VRS)
- EACH VR IS THE EQUIVALENT OF AN INDEPENDENT HARDWARE ROUTER
- VR AS AN OBJECT GROUP ENABLES CUSTOMIZED SERVICES PER SUBSCRIBER
- INVISION ALLOWS EASE OF SERVICE PROVISIONING AND MAINTENANCE OF SERVICES ACROSS ALL IPSX UNITS IN A SP NETWORK
- IP NETWORK OPERATING SYSTEM'S (IPNOS) OPEN APPLICATION PROGRAM INTERFACE (API) ENABLES NEW SERVICES TO BE CONTINUALLY ADDED TO THE PLATFORM

Fig. 4



- EACH SUBSCRIBER HAS A SET OF PARTITIONED VIRTUAL ROUTERS (VRS) 210
- EACH VR 210 IS THE EQUIVALENT OF AN INDEPENDENT HARDWARE ROUTER
- VR 210 AS AN OBJECT GROUP 211 ENABLES CUSTOMIZED SERVICES PER SUBSCRIBER
- INVISION 221 ALLOWS EASE OF SERVICE PROVISIONING AND MAINTENANCE OF SERVICES ACROSS ALL IPSX UNITS 201 IN A SP NETWORK 200
- IP NETWORK OPERATING SYSTEM'S (IPNOS) 220 OPEN APPLICATION PROGRAM INTERFACE (API) ENABLES NEW SERVICES TO BE CONTINUALLY ADDED TO THE PLATFORM

Fig. 5

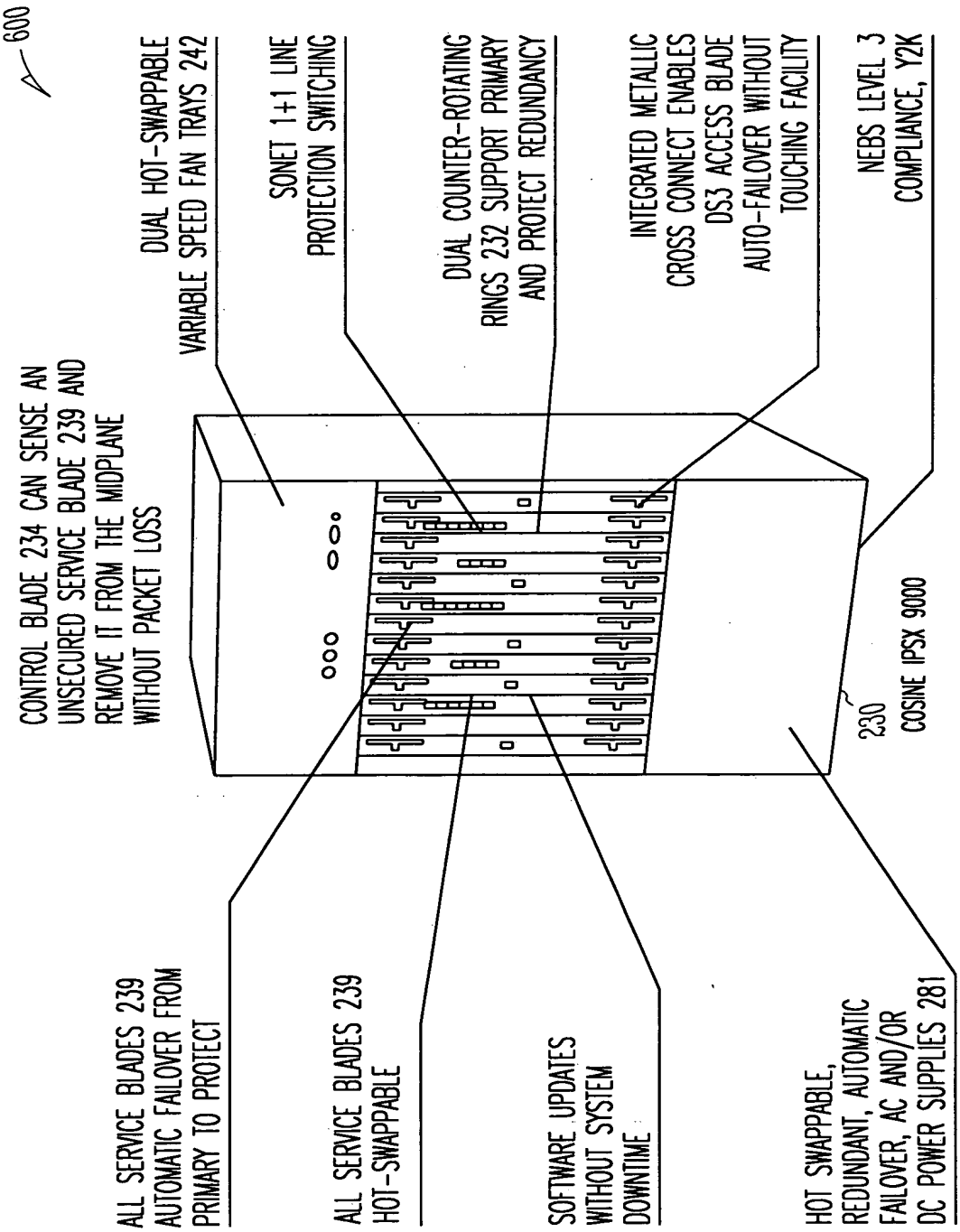
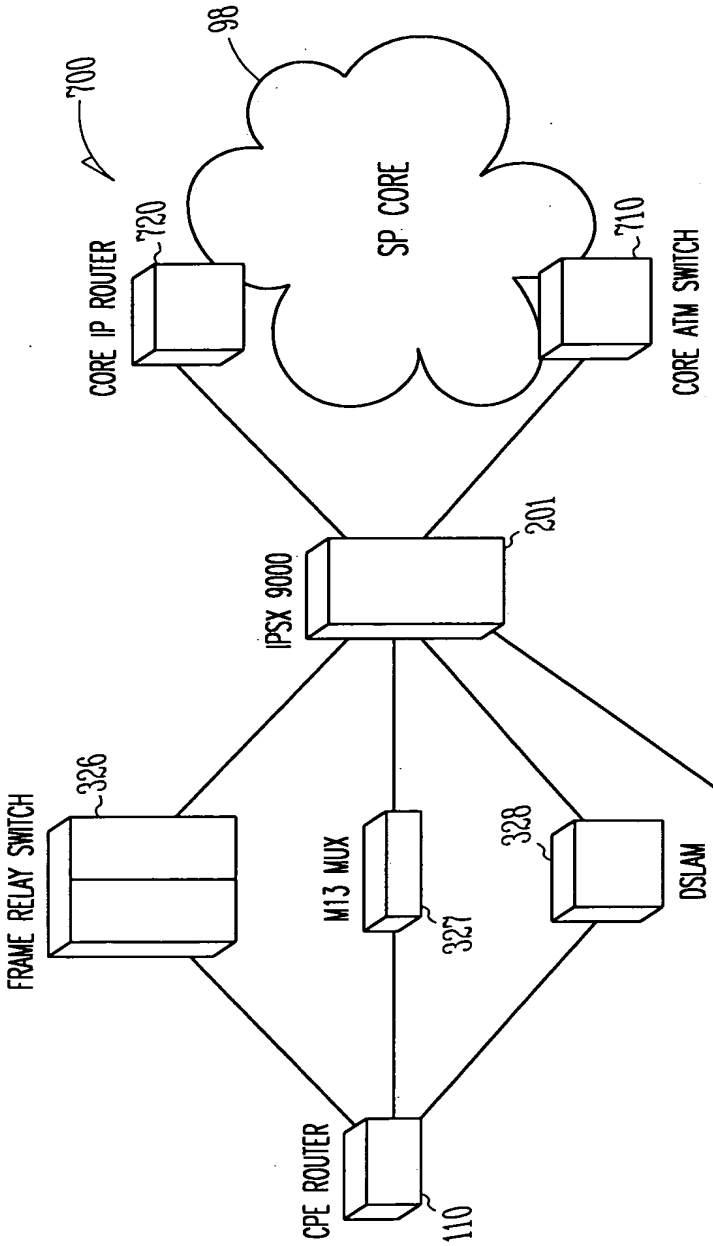

600
CONTROL BLADE 234 CAN SENSE AN UNSECURED SERVICE BLADE 239 AND REMOVE IT FROM THE MIDPLANE WITHOUT PACKET LOSS
DUAL HOT-SWAPPABLE VARIABLE SPEED FAN TRAYS 242
SONET 1+1 LINE PROTECTION SWITCHING
DUAL COUNTER-ROTATING RINGS 232 SUPPORT PRIMARY AND PROTECT REDUNDANCY
INTEGRATED METALLIC CROSS CONNECT ENABLES DS3 ACCESS BLADE AUTO-FAILOVER WITHOUT TOUCHING FACILITY
NEBS LEVEL 3 COMPLIANCE, Y2K
230
COSINE IPSX 9000
ALL SERVICE BLADES 239 AUTOMATIC FAILOVER FROM PRIMARY TO PROTECT
ALL SERVICE BLADES 239 HOT-SWAPPABLE
SOFTWARE UPDATES WITHOUT SYSTEM DOWNTIME
HOT SWAPPABLE, REDUNDANT, AUTOMATIC FAILOVER, AC AND/OR DC POWER SUPPLIES 281

Fig. 6



- SUPPORT FOR A LONG LIST OF TECHNOLOGY STANDARDS
- INTEROPERATES WITH EXISTING ACCESS CONCENTRATION AND CORE NETWORK ELEMENTS
- OFFER INTERWORKING BETWEEN FRAME RELAY AND IP NETWORKS
- NETWORK ADDRESS TRANSLATION (NAT) ENABLES ENTERPRISE SUBSCRIBERS TO LEAVE THEIR NETWORK ADDRESSING UNTOUCHED
- MERGE IP AND LEGACY NETWORKS INTO ONE WITH COS GUARANTEES

Fig. 7

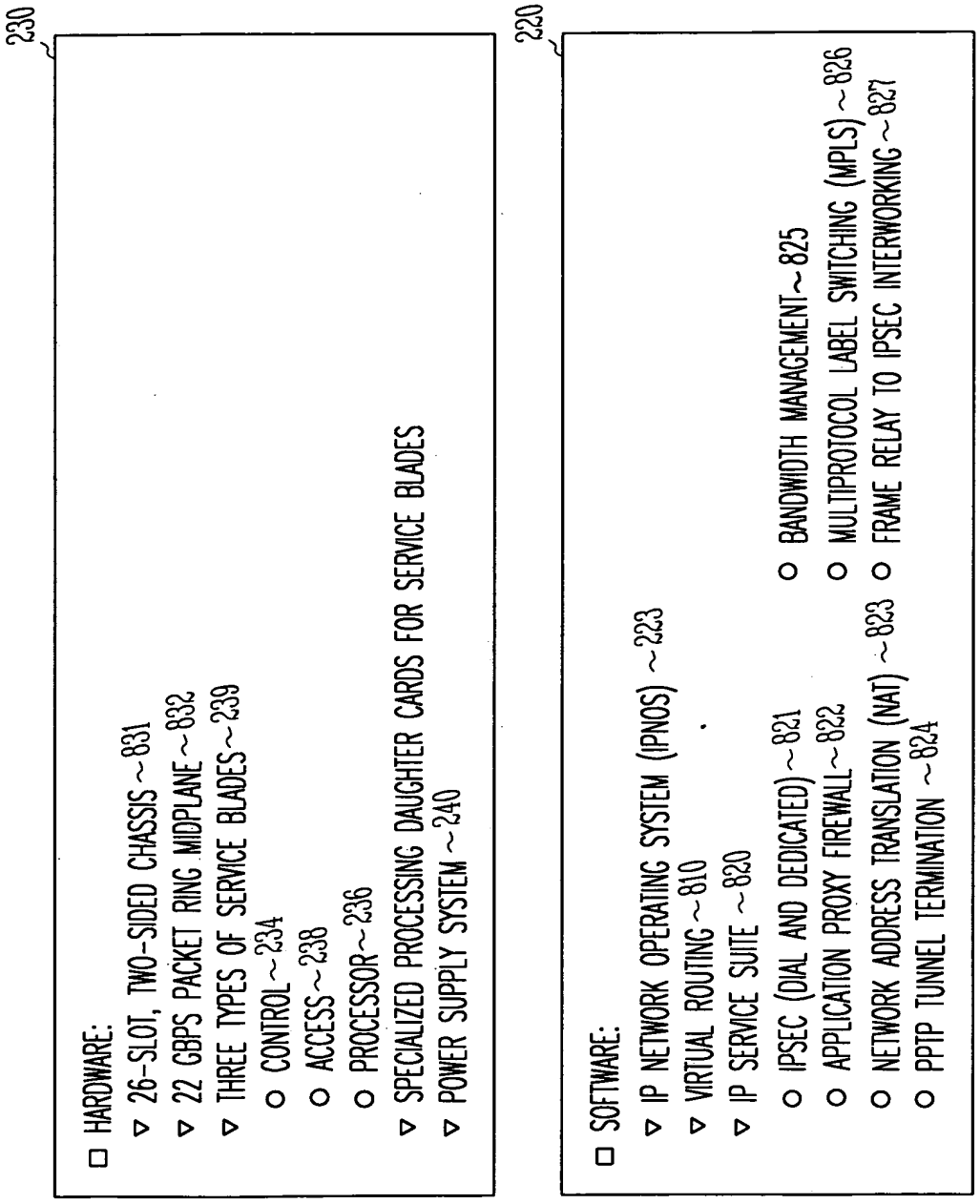

230
HARDWARE:
26-SLOT, TWO-SIDED CHASSIS ~831
22 GBPS PACKET RING MIDPLANE ~832
THREE TYPES OF SERVICE BLADES ~239
CONTROL ~234
ACCESS ~238
PROCESSOR ~236
SPECIALIZED PROCESSING DAUGHTER CARDS FOR SERVICE BLADES
POWER SUPPLY SYSTEM ~240
220
SOFTWARE:
IP NETWORK OPERATING SYSTEM (IPNOS) ~223
VIRTUAL ROUTING ~810
IP SERVICE SUITE ~820
IPSEC (DIAL AND DEDICATED) ~821
APPLICATION PROXY FIREWALL ~822
NETWORK ADDRESS TRANSLATION (NAT) ~823
PPTP TUNNEL TERMINATION ~824
BANDWIDTH MANAGEMENT ~825
MULTIPROTOCOL LABEL SWITCHING (MPLS) ~826
FRAME RELAY TO IPSEC INTERWORKING ~827

Fig. 8

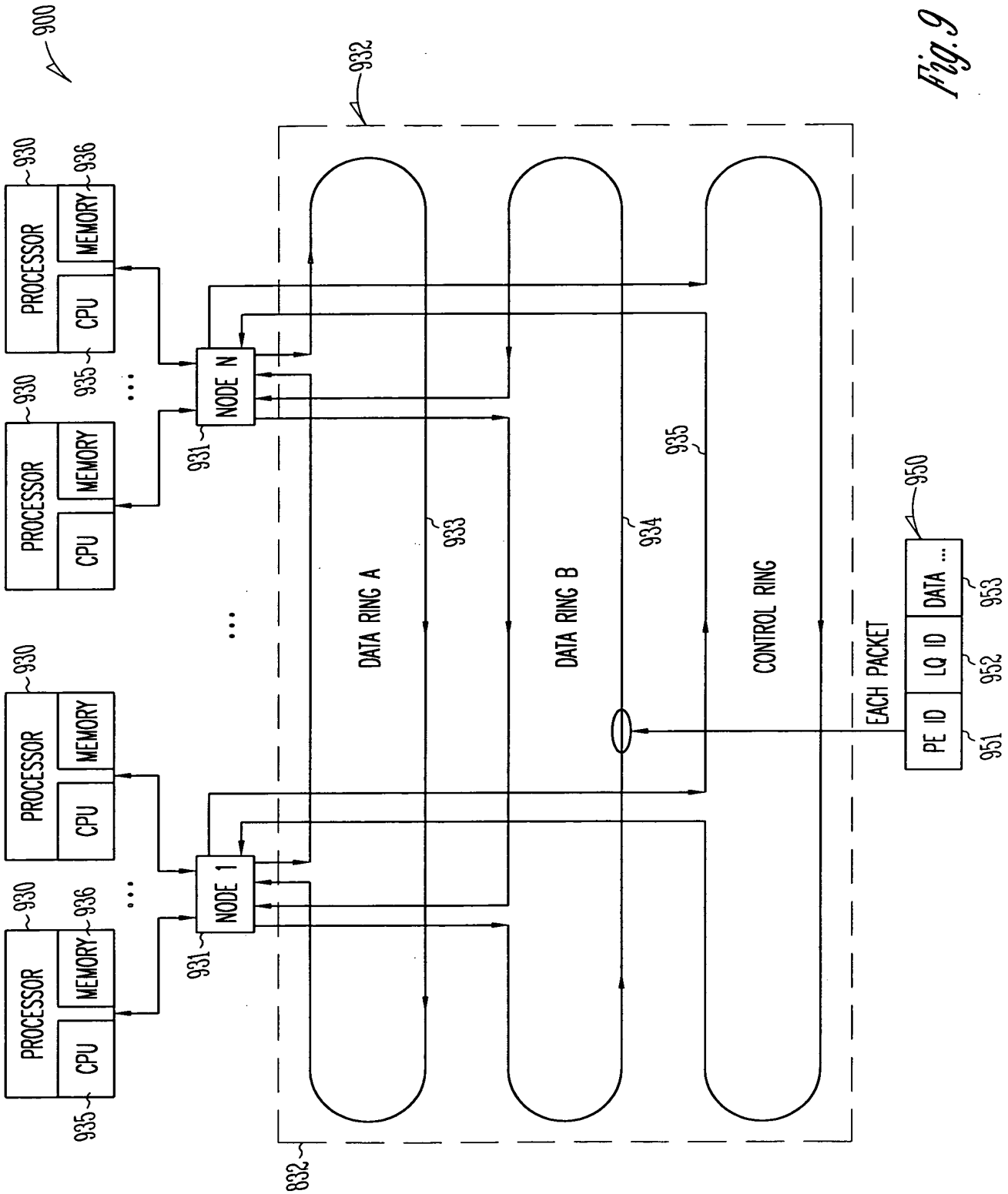

900
932
930
936
PROCESSOR
MEMORY
CPU
935
NODE N
931
NODE 1
933
DATA RING A
934
DATA RING B
CONTROL RING
950
EACH PACKET
PE ID
LQ ID
DATA ...
951
952
953

Fig. 9

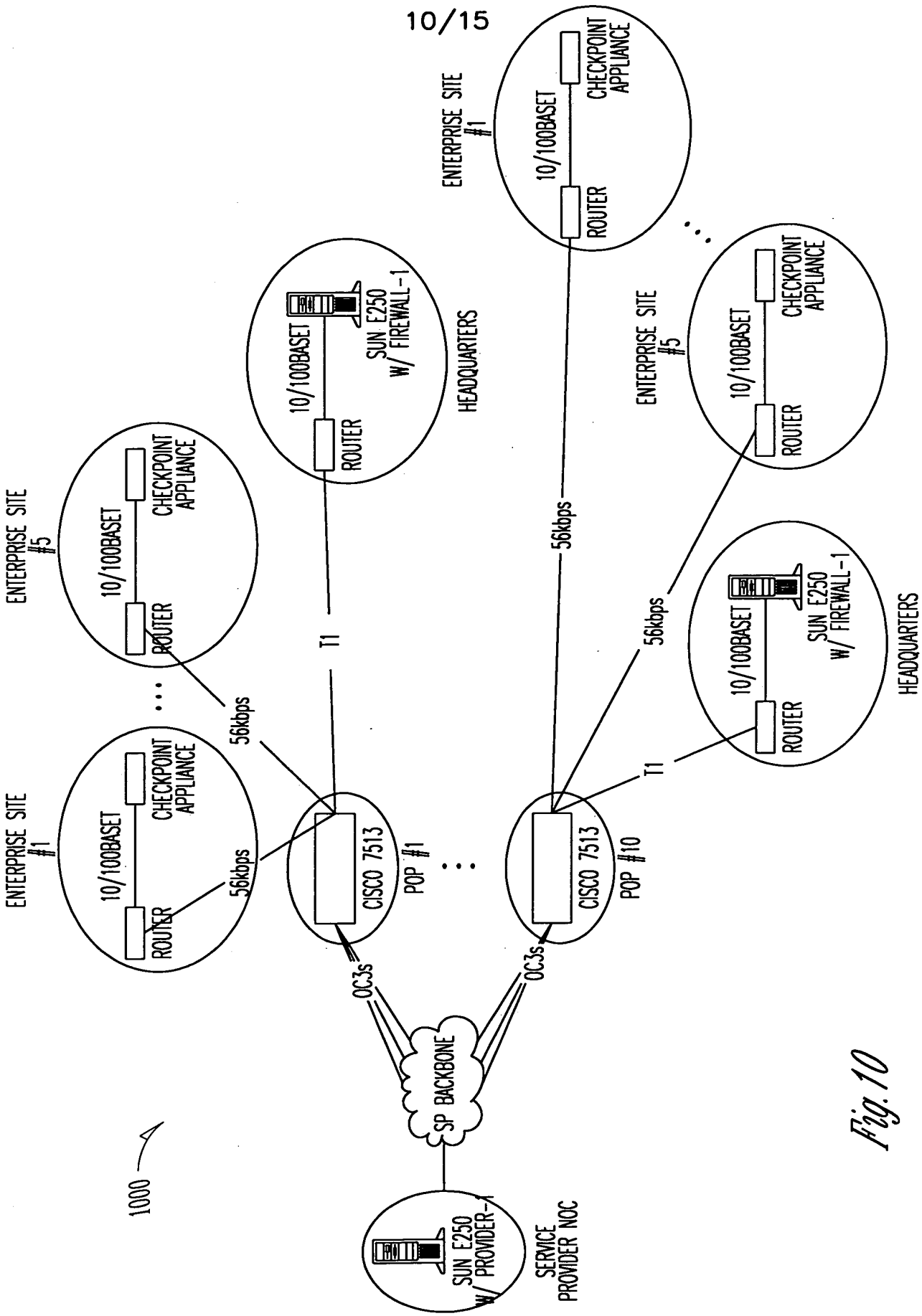

1000
ENTERPRISE SITE #1
10/100BASET
CHECKPOINT APPLIANCE
ROUTER
56kbps
ENTERPRISE SITE #5
10/100BASET
CHECKPOINT APPLIANCE
ROUTER
56kbps
CISCO 7513
POP #1
OC3s
T1
HEADQUARTERS
10/100BASET
SUN E250 W/ FIREWALL-1
ROUTER
SP BACKBONE
SUN E250 W/ PROVIDER-1
SERVICE PROVIDER NOC
ENTERPRISE SITE #1
10/100BASET
CHECKPOINT APPLIANCE
ROUTER
56kbps
ENTERPRISE SITE #5
10/100BASET
CHECKPOINT APPLIANCE
ROUTER
56kbps
CISCO 7513
POP #10
OC3s
T1
HEADQUARTERS
10/100BASET
SUN E250 W/ FIREWALL-1
ROUTER

Fig. 10

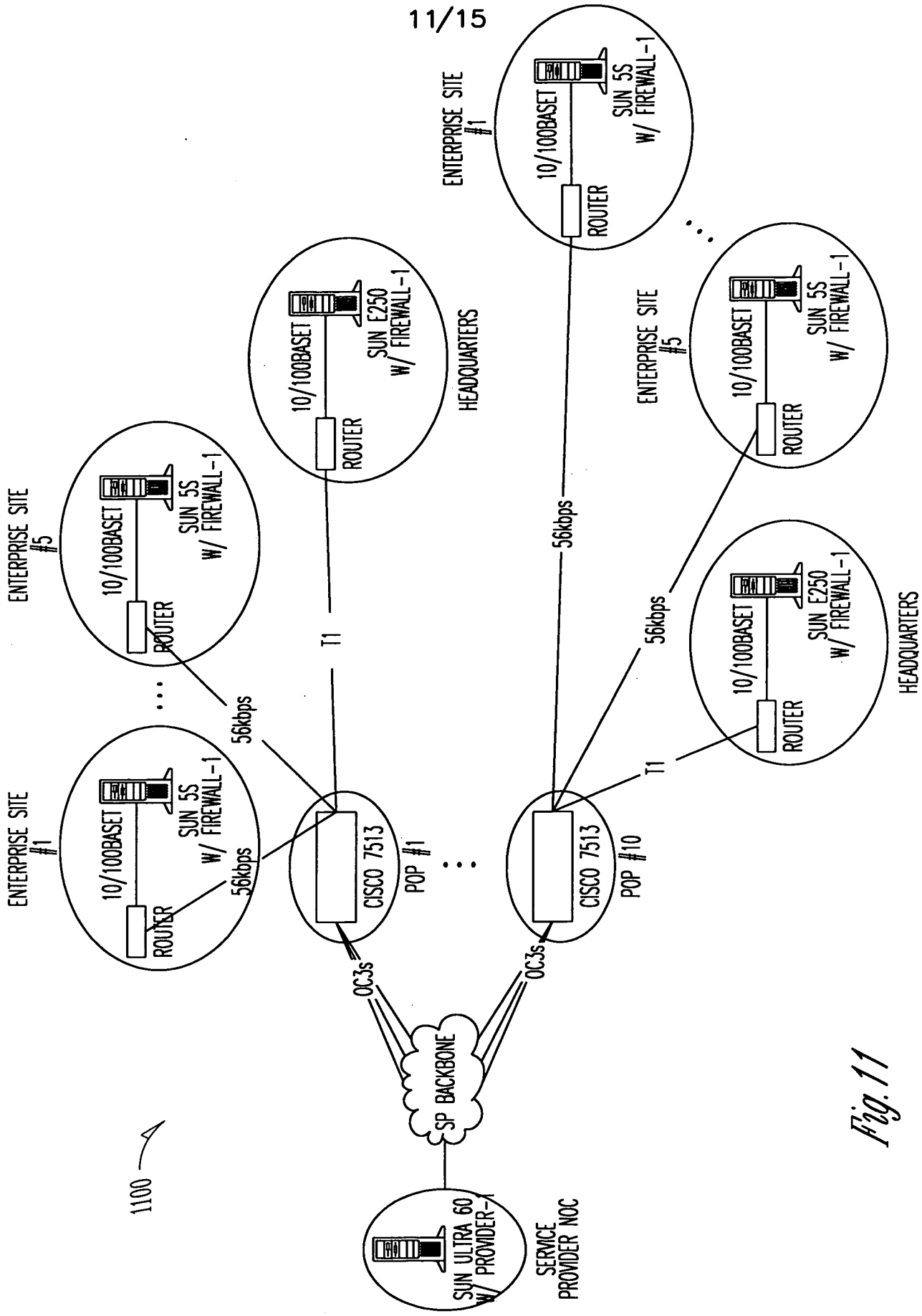

1100
SUN ULTRA 60 W/ PROVIDER-1
SERVICE PROVIDER NOC
SP BACKBONE
OC3s
OC3s
CISCO 7513
POP #1
CISCO 7513
POP #10
56kbps
56kbps
T1
T1
56kbps
56kbps
ENTERPRISE SITE #1
10/100BASET
SUN 5S W/ FIREWALL-1
ROUTER
ENTERPRISE SITE #5
10/100BASET
SUN 5S W/ FIREWALL-1
ROUTER
HEADQUARTERS
10/100BASET
SUN E250 W/ FIREWALL-1
ROUTER
ENTERPRISE SITE #1
10/100BASET
SUN 5S W/ FIREWALL-1
ROUTER
ENTERPRISE SITE #5
10/100BASET
SUN 5S W/ FIREWALL-1
ROUTER
HEADQUARTERS
10/100BASET
SUN E250 W/ FIREWALL-1
ROUTER

Fig. 11

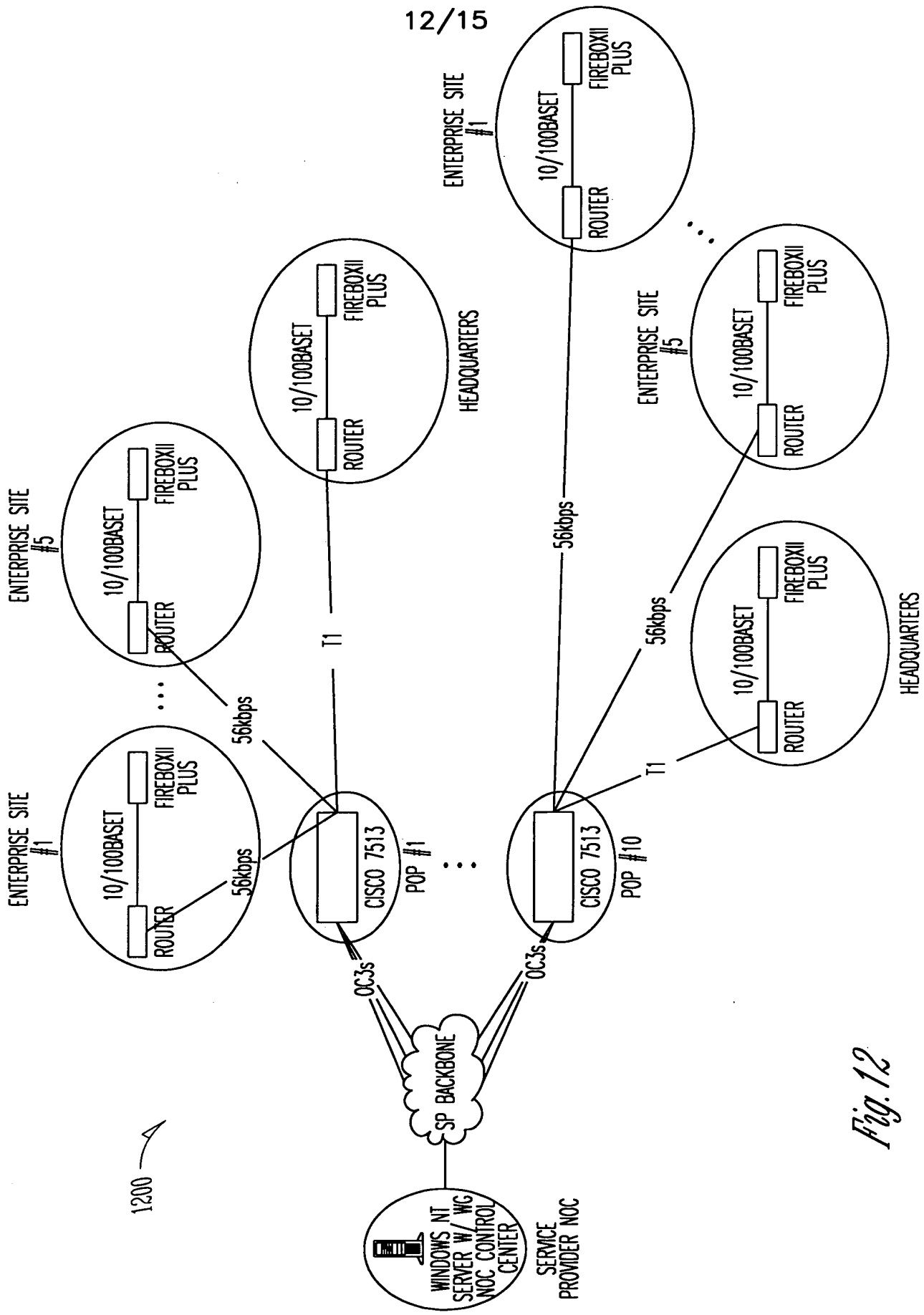

1200
ENTERPRISE SITE #1
10/100BASET
FIREBOXII PLUS
ROUTER
56kbps
ENTERPRISE SITE #5
10/100BASET
FIREBOXII PLUS
ROUTER
56kbps
T1
HEADQUARTERS
10/100BASET
FIREBOXII PLUS
ROUTER
T1
CISCO 7513
POP #1
CISCO 7513
POP #10
OC3s
OC3s
SP BACKBONE
WINDOWS NT SERVER W/ WG NOC CONTROL CENTER
SERVICE PROVIDER NOC

Fig. 12

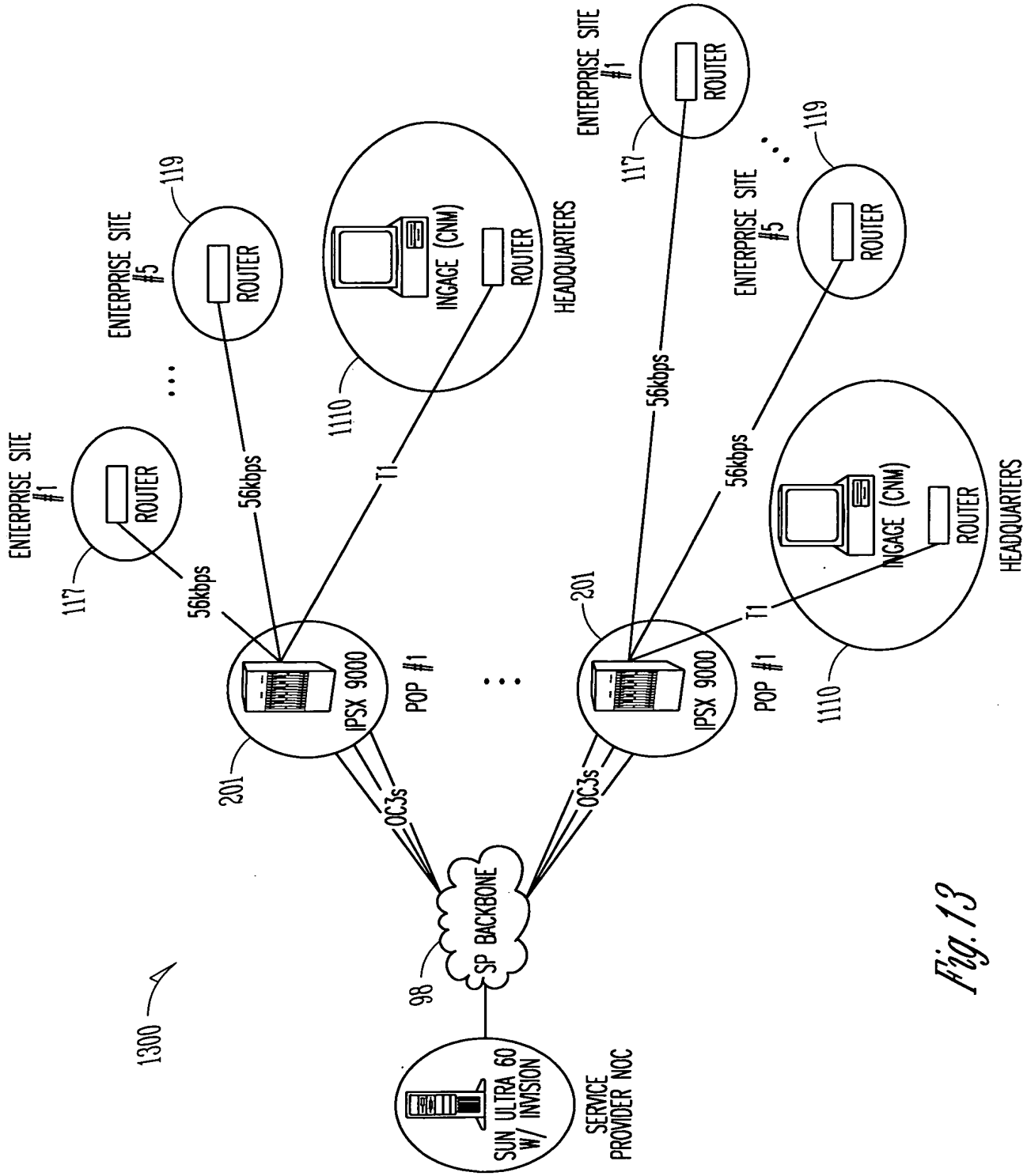

1300
ENTERPRISE SITE #1
ROUTER
117
56kbps
ENTERPRISE SITE #5
ROUTER
119
56kbps
INGAGE (CNM)
ROUTER
HEADQUARTERS
1110
T1
IPSX 9000
POP #1
201
OC3s
SP BACKBONE
98
SUN ULTRA 60 W/ INVISION
SERVICE PROVIDER NOC

Fig. 13

1400

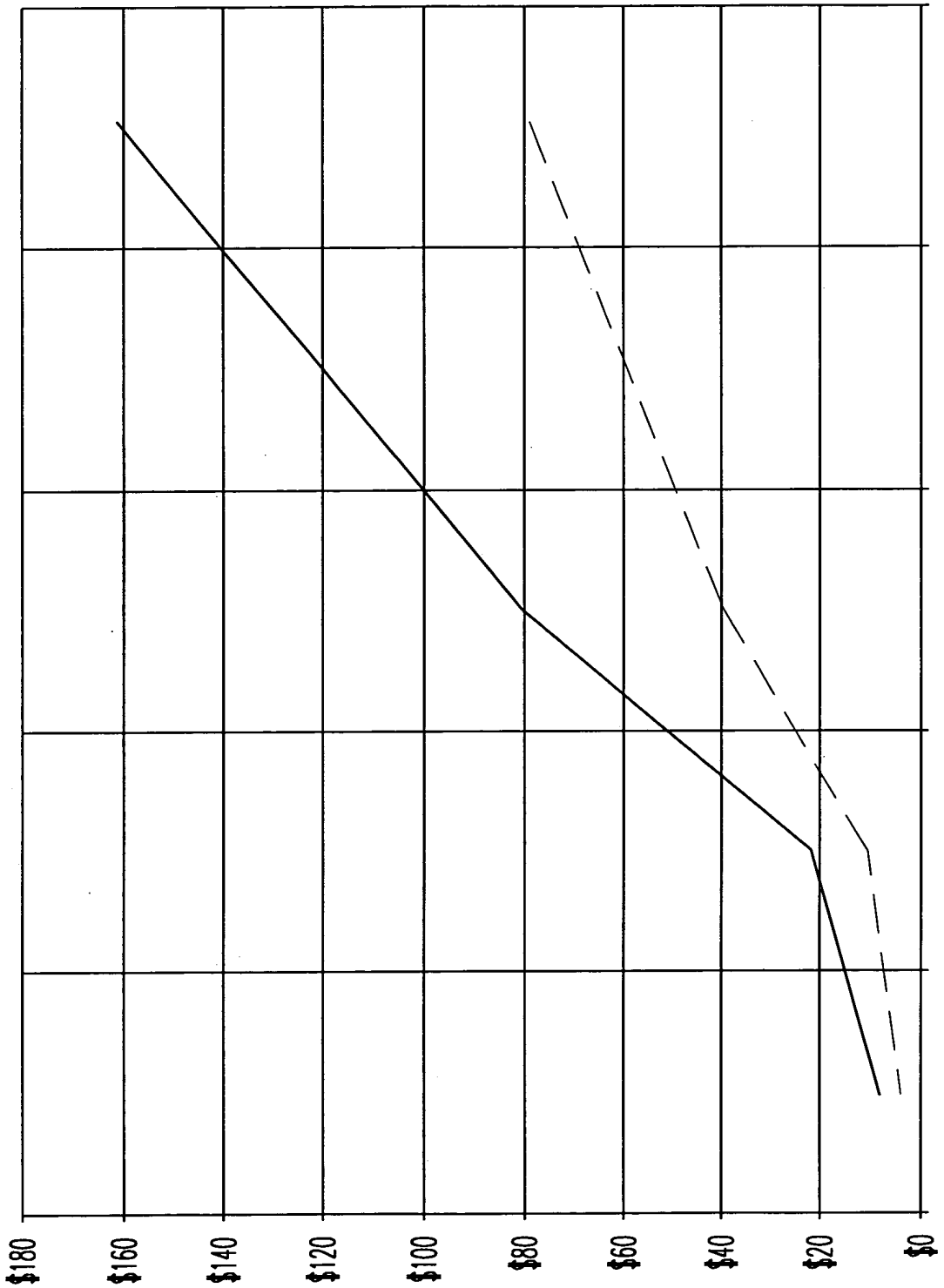


Fig. 14

1500

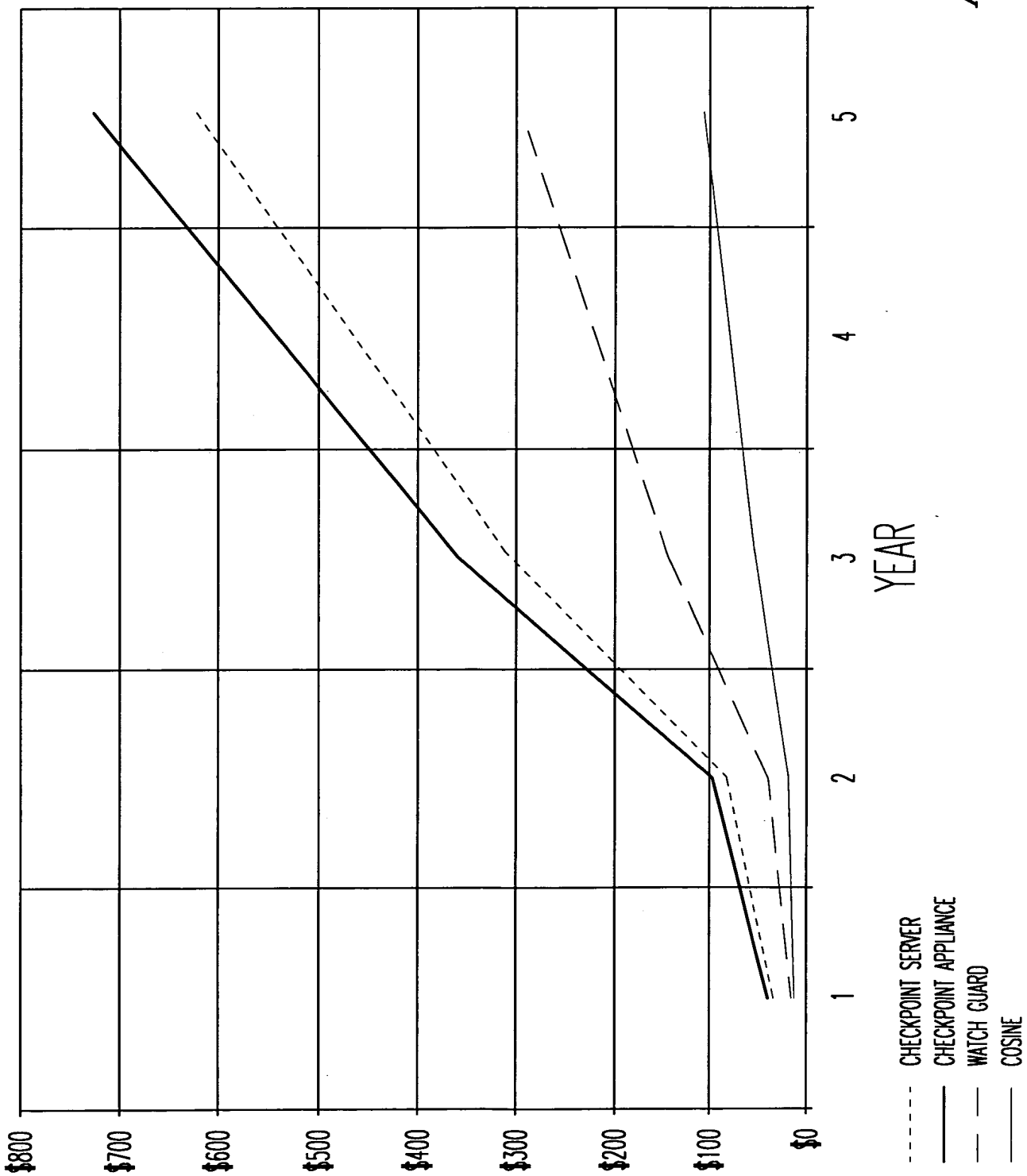

$800
$700
$600
$500
$400
$300
$200
$100
$0
COST (MILLIONS)
1
2
3
4
5
YEAR
CHECKPOINT SERVER
CHECKPOINT APPLIANCE
WATCH GUARD
COSINE

Fig. 15